

WHAT IS CLAIMED IS:

1. A method of improving the efficacy of a metal halide lamp comprising:
 - 5 disposing a multilayer coating on a surface of an arc tube, the coating comprising layers of at least two materials of different refractive index, which in combination reflect radiation in the UV region of the electromagnetic spectrum, the coating being optimized to reflect at least 95% of UV radiation striking the coating;
 - 10 operating the lamp to cause UV emission from an arc; and reflecting the UV radiation back into the lamp.
2. The method of claim 1, wherein the coating is optimized to reflect at least 98% of UV radiation striking the coating.
- 15 3. The method of claim 1, wherein the coating reflects UV radiation such that at least 45% of the UV emitted by the arc in the wavelength range of 300-400 nm reaches a metal halide pool.
- 20 4. The method of claim 1, wherein the coating is optimized so that it has its greatest reflectivity in the region of the UV spectrum where the UV emission from the lamp is greatest.
5. The method of claim 1, further including:
 - 25 determining a spectral distribution of the lamp when uncoated; and optimizing the coating to provide greater reflectivity in the region of the UV spectrum where the UV emission is greatest.
6. The method of claim 1, further including:
 - 30 reflecting a portion of light in the visible region of the spectrum back into the lamp.

7. The method of claim 6, further including:
reflecting a portion of the visible light in a wavelength range of from
400-450 nanometers back into the lamp.

5 8. The method of claim 1, further including:
 optimizing the multi-layer coating at an angle which is selected to take
into account off-normal incidence of the radiation on the arctube during
operation of the lamp.

10 9. The method of claim 8, further including:
 determining a mean angle at which UV light strikes the arctube; and
 selecting the angle at which the coating is optimized to be within about
10° of the mean angle.

15 10. The method of claim 9, wherein the angle at which the coating is
optimized is within about 5° of the mean angle.

 11. A method for improving the efficiency of a metal halide lamp
comprising:
20 determining a spectral power distribution for the lamp; and
 disposing a multilayer coating on a surface of an arctube of the lamp
which reflects radiation in the UV region of the electromagnetic spectrum, the
coating being optimized to reflect UV light at each of a plurality of wavelengths
in direct proportion to the spectral power at each of the plurality of
25 wavelengths.

 operating the lamp to cause UV emission from an arc; and
 reflecting the UV radiation back into the lamp.

 12. The method of claim 11, wherein the coating reflects UV
30 radiation such that at least 45% of the UV emitted by the arc in the
wavelength range of 300-400 nm reaches a metal halide pool.

13. A method of improving the efficacy of a metal halide lamp comprising:

5 disposing a multi-layer coating on a surface of an arctube, the coating comprising layers of at least two materials of different refractive index, which in combination reflect radiation in the UV region of the electromagnetic spectrum, the multi-layer coating being optimized at an angle which is selected to take into account off-normal incidence of the radiation on the arctube during operation of the lamp;

10 operating the lamp to cause UV emission; and
reflecting the UV radiation back into the lamp.

14. The method of claim 13, wherein the method further includes:
determining a mean angle at which UV light within the arctube is incident on the arctube; and

15 selecting the angle at which the coating is optimized to be within about 10° of the mean angle.

15. The method of claim 14, wherein the angle at which the coating is optimized is within about 5° of the mean angle.

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16. The lamp of claim 13, wherein the angle at which the coating is optimized is less than 35° from a direction normal to the arctube surface.

17. The method of claim 16, wherein angle at which the coating is optimized is from 10° to 35°.

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18. The method of claim 17, wherein the arctube is vertically aligned and the angle at which the coating is optimized is from about 15° to about 30°.

19. The lamp of claim 18, wherein the arctube is generally cylindrical in shape and the angle at which the coating is optimized is between about 20 and about 30°.

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20. The method of claim 13, wherein the angle at which the coating is optimized is within about 10° of a mean angle at which UV light strikes the arctube wall.

5 21. The method of claim 20, wherein the angle at which the coating is optimized is within 5° of the mean angle.

22. The method of claim 13, wherein the step of disposing a multi-layer coating on a surface of an arctube includes:

10 utilizing a computer program for calculating a thickness of each of the layers and an optimum number of layers in the coating to optimize the coating at the angle.

23. The method of claim 13, wherein the step of optimization of the
15 coating includes applying a greater weighting to providing high reflectivity in regions of the UV spectrum where spectral power is high.

24. The method of claim 13, wherein the coating is optimized to
20 reflect an average of at least 90% of the UV emission of the lamp between 300 and 391 nm.

25. The method of claim 24, wherein the coating is optimized to
25 reflect an average of at least 95% of the UV emission of the lamp between 300 and 370 nm.

26. A metal halide lamp comprising:
an envelope;
a metal halide pool within the envelope for generating a discharge
when the lamp is operated;
30 a multi-layer coating on a surface of the envelope, the coating
comprising layers of at least two materials of different refractive index, which

in combination reflect radiation in the UV region of the electromagnetic spectrum, the multi-layer coating being optimized for at least one of:

- 5 a) reflection of UV radiation which strikes the envelope at an angle which is within 10° of a mean angle of incidence of the UV radiation on the arc tube,
- b) reflection of at least 95% of UV radiation striking the coating; and
- c) reflection of UV light at each of a plurality of wavelengths in direct proportion to the spectral power at each of the plurality of wavelengths.

- 10 27. The lamp of claim 26, wherein the coating is optimized to provide at least an average of 96% transmission in the 450-650 nm range.